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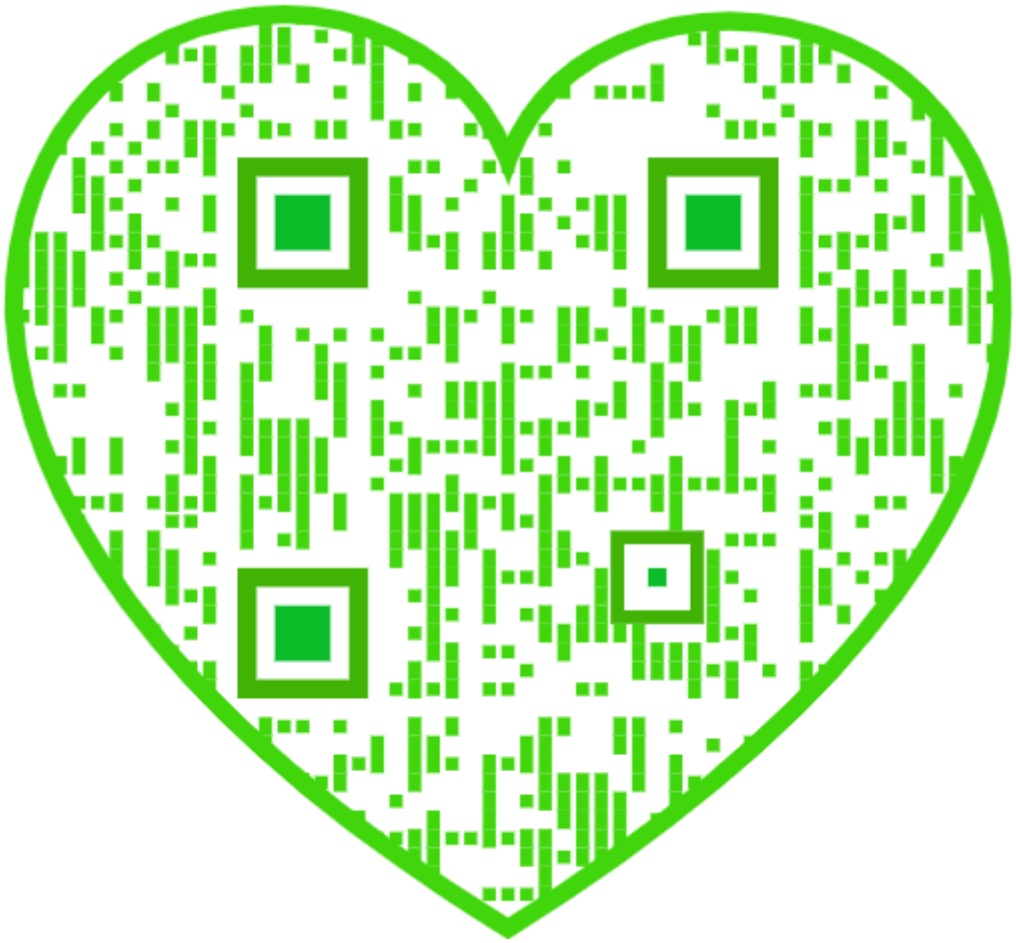

SMITHSONIAN INSTITUTION.
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A STUDY OF THE ESKIMO BOWS IN THE U. S. NATIONAL MUSEUM.

BY

JOHN MURDOCH.

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III.—A STUDY OF THE ESKIMO BOWS IN THE U. S. NATIONAL MUSEUM.

By JOHN MURDOCH.

While endeavoring to work out the method of construction of the bows collected by our party* among the Eskimos of Point Barrow, Arctic Alaska, I was led to make a comparative study of all the Eskimo bows in the National Museum with the view of determining the types of construction to be found among them, and their geographical distribution.

It is the purpose of this paper to present the general conclusions arrived at from this study, which I propose to treat in detail in a monograph of the ethnological collection of the expedition, which I am engaged in preparing. I am indebted to Professor Otis T. Mason, of the National Museum, for much cordial assistance and co-operation in the prosecution of this study and in the preparation of the illustrations.

I have confined myself to the discussion of the forms of bow in use among the Western Eskimos, namely, those inhabiting the shores of the Arctic Ocean from the Mackenzie River westward to Bering Strait, of Bering Sea and the Gulf of Alaska, with the outlying Asiatic branches on the mainland of Siberia and Saint Lawrence Island. These regions are very fully represented in the Museum by the collections of Ross and MacFarlane from the Mackenzie River region, Dall, Turner, Nelson, and others, from the Alaska coast, Nelson, from Saint Lawrence Island, and the North Pacific Exploring Expedition, from the mainland of Siberia, while the material from the eastern tribes is very scanty and unsatisfactory.

Starting from the island of Kadiak in the south, there is abundant material from the whole coast as far as the northern shore of Norton Sound, from the Diomede Islands, Point Hope, Wainwright's Inlet, Point Barrow, and the Mackenzie region, as well as from Saint Lawrence Island and the Siberian shore. Unfortunately, the region about Kotzebue Sound, including the great peninsula between this and Norton Sound, is not represented in the collection.

The field of investigation is practically untrodden. Although it has long been known that the Eskimos used cords of elastic sinew to counteract the brittleness and lack of elasticity in the spruce and fir—the only wood at their disposal for making bows—authors have confined

*U. S. International Polar Expedition to Point Barrow, 1881–'83.

themselves to a general statement of the fact, without going into the details of construction.*

I have found that the bows of the Western Eskimos are constructed upon three well-defined types, each quite distinctly limited in its geographical distribution. No one of these types can be considered as derived from either of the others, but all are plainly developed from a single original type still to be found only slightly modified in the region around Cumberland Gulf, where the mechanical arts seem to have remained in many respects more primitive than either in Greenland or Alaska. (Fig. 1, back and side view of a bow of reindeer antler from Cumberland Gulf, No. 34053, collected by L. Kumlien.)†

The main part of the reinforcement or backing always consists of a continuous piece of stout twine made of sinew, generally a three-strand braid, but sometimes a twisted cord, and often very long (sometimes forty or fifty yards in length). One end of this is spliced or knotted into an eye, which is slipped round one "nock" of the bow, usually the upper one. The strands then pass up and down the back and round the nocks. A comparatively short bow, having along its back some dozen or twenty such plain strands, and finished off by knotting the end about the "handle," appears to have been the original pattern. The bow from Cumberland Gulf (Fig. 1) is such a one, in which the strands have been given two or three turns of twist from the middle. They are kept from untwisting by a "stop" round the handle, which passes between and around the strands.

The three Western Eskimo types may be described as follows:

I. The Southern Type.

Of this there are two slightly different patterns, found often side by side.

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*For example: "They ingeniously remedy the defect [*i. e.*, the want of elasticity in the material] by securing to the back of the bow and to the knobs at each end a quantity of small lines, each composed of a plat or 'sinnet' of three sinews. The number of lines thus reaching from end to end is generally about thirty; but besides these several others are fastened with hitches round the bow, in pairs, commencing eight inches from one end and again united at the same distance from the other, making the whole number of strings in the middle of the bow sometimes amount to sixty. These being put on when the bow is somewhat bent in the contrary way, produce a spring so strong as to require considerable force as well as knack in stringing it and giving the requisite velocity to the arrow." (Parry's Second Voyage, p. 511.)

"These bows [in the Yukon delta] are made of spruce, which has little elasticity when dry and is very liable to break. To remedy this defect the bow is bound with cords twisted from deer sinew [as shown in a figure, which gives the general appearance very well]. This gives it great strength and overcomes the brittleness of the wood." (Dall's Alaska and its Resources, p. 228.)

"Only some old bows had a finer form. They were larger and made with care; for instance, they were covered with birch bark and strengthed by an artistic plaiting of sinew on the outer side." (Nordenskiöld's Voyage of the Vega, ii, p. 108.)

†When a scale accompanies a figure each division represents one inch. Figures without a scale are natural size, unless otherwise specified.

1. A broad and flat bow tapering to the nocks, which are formed by simple rounded knobs, and narrowed and thickened at the handle so as to be half as wide and twice as thick as the broadest part of the bow. The back is flat and the belly often keeled from end to end, and this keel is sometimes deeply furrowed for its whole length; the edges are generally square and sometimes grooved longitudinally. (Figs. 2, 3, and 4 show the general pattern of this type.) The bow when unstrung is either straight, slightly sprung toward the back, or, rarely, arched, and is sometimes stiffened along the back with an extra rib of wood or ivory. The backing is occasionally tightened with wedges. Its length is from 50 inches to 5 feet, averaging about 55 inches, with its greatest breath about 2 inches (rarely $2\frac{1}{4}$ to $2\frac{1}{2}$ inches).

2. A bow of essentially the same size and outline as the first form, but with about one foot of each end bent up toward the back so as to lie parallel to the string when the bow is strung, as in the Tatar bow, with the backing generally stretched over bridges at the bends. (Fig. 5, No. 36028, from the mouth of the Kuskoquim River, collected by E. W. Nelson.)

The backing starts in the ordinary way and consists wholly of straight parallel strands passing round the nocks, or secured by pairs of half-hitches at various points on the bow. The last strand is wrapped spirally round the others to keep them from spreading apart, though occasionally one end of the cable is wrapped with a separate piece, and very rarely the whole wrapping is separate from the rest. A separate piece of twine, thong, or withe serves to stop the backing down to the handle, and there are sometimes other separate stops on the broad part of the bow (as in Fig. 2). The whole of the broad part of the bow is occasionally seized down with spaced spiral turns of twine (Fig. 4, No. 7972, from Bristol Bay, collected by Dr. Minor), which, in one case at least, are made by the end of the last strand. The strands of the backing vary in number from 11 to 37 (usually about 25). They are sometimes all of the same length, in which case the outer strands are hitched round the bow a short distance from the nocks instead of passing round the latter (Fig. 2, back and side view, and Fig. 2 *a*, one end of No. 36032, from near Cape Romanzoff, collected by E. W. Nelson). More commonly 4–22, usually 6 or 7 strands are shorter than the rest and only extend from the broadest part of one end to the corresponding point at the other (Fig. 3, No. 72408, from Bristol Bay, collected by the late C. L. McKay. Fig. 3 *a*, the broadest part of the same bow, to show the attachment of the short strands), thus giving special strength and elasticity to the middle of the bow.

These shorter strands are sometimes the outer ones of the backing, but more commonly about the middle of it. Rarely, as in the case of one bow from the island of Nunivak (Fig. 6, No. 15651, collected by W. H. Dall. This is an unusually large and stout bow, with 37 strands in

the cable), and one from near Cape Romanzoff (Fig. 7, No. 36034, collected by E. W. Nelson), the strands are twisted from the middle (the two ends of the bow in opposite directions) by introducing a toggle between the strands, and the twist is secured by passing the "stop" through the cable.

This type extends from the island of Kadiak to Norton Sound. The second form of the type appears to be less common than the first, though occurring alongside of the latter. It appears not to be used on the island of Nunivak or south of the Kuskoquim River.

II. The Arctic Type.

This is a much shorter bow than the above (from 43 to 52 inches long), narrow in proportion, and of a much more graceful shape (Fig. 8, No. 1972, from the Mackenzie region, collected by Ross). In section it is nearly elliptical, flatter on the back than on the belly, with the handle slightly narrowed and thickened. The greatest breadth is usually about $1\frac{1}{4}$ inches, and the thickness at the handle about $\frac{3}{4}$ inch. The ends are often bent up as in the second form of the southern type, and when this is done the back is usually reinforced with a short rounded strap of wood or antler in the bend. One bow (Fig. 9, No. 89245, from Point Barrow, collected by our expedition) has these ends made of separate pieces mortised on. Only one bow of this type in the collection has an extra rib, which is of antler and very small and short, but the back is frequently covered with strips of sealskin, put on lengthwise.

The backing is always of braided sinew, and of a very complicated and perfect pattern, usually very thoroughly incorporated with the bow by means of hitches and a very complete seizing of many turns running nearly the whole length of the bow and serving to equalize the distribution of the strain and thus prevent cracking.

The backing is one continuous piece of cord, except in one case, where the seizing is separate, and begins, as usual, with an eye, which is slipped round the upper nock. The strands vary in number from 30 to 45 on a man's bow (22–28 on a boy's) of which 10–26 extend only from bend to bend on a bow of the Tatar shape, or between the corresponding points on a straight bow, and are then made fast by two or three half-hitches each, or, as at Point Barrow, Wainwright's Inlet, and Point Hope, by complicated lashings made up of series of half-hitches, often alternately in opposite directions, the last hitch or two held down by extra round turns, and sometimes as many as a dozen hitches in a series. Fig. 10 is this section of the same large bow, No. 89245, from Point Barrow, figured above, and Fig. 11, the same part of No. 72771, from Wainwright's Inlet, also collected by our expedition.

A detailed description of the lashings of these bows, two of the most complicated in the collection, will make these figures plain. The first

long strand on reaching the bend is hitched round the bow seven times at intervals of about ¾ to 1 inch. These "under-hitches," as they may be called, occur always on bows of this type, sometimes made by the first and sometimes by the last long strand, and serve to mark off the position of the hitches of the short strands and give them a *point d'appui*. The first two of these are "two half-hitches," or, "clove-hitches," as they are called at sea, the other five peculiar hitches (Fig. 12) not used by sailors. The hitch is well known and much used in the artillery and ordnance service, and is there called a "clove-hitch." As using this name would not distinguish the hitch from the common "clove-hitch" of seamen, I venture to suggest for it the name of "soldier's hitch." It is made by taking two round turns round the object to be fastened to and bringing the end over the standing part and under the two turns. If the turns are taken to the left, it makes Fig. 12; if to the right, Fig. 13.

These hitches, especially the left-handed one, are much used by the Eskimos not only on bows, but in putting on seizings upon spears, &c., where a white seaman would use a "marling-hitch." The advantage of this form of hitch seems to be that the second round turn keeps it from slipping if the end gets loose.

To return to No. 89245: After making "under-hitches" at both bends, long strands are laid on till there are ten in all. The eleventh, on reaching the bend, makes two "soldier's hitches" at 1, and going to the other nock is similarly hitched at the other bend, and then passes backwards and forwards between the bends, hitched each time nearer the middle of the bow. The hitch at 2 is made thus: Two round turns to the left, the end passed under both turns, and then two more round turns, with the end passed over the second turn, under the first and third, over the standing-part and third turn, making a double "soldier's hitch." At 3 are two simple half-hitches, and one made with two round turns, followed by two round turns with the end passed under both. At 4 is a similar lashing with eight simple hitches; at 5, nine; at 6, four; and at 7, two.

In No. 72771 there are five "under hitches," all "soldier's hitches," made by the first long strand. The lashing at 1 is made by hitching alternately to right and left five times. (Such hitching is called "kackling" by seamen.) At 2 it is "kackled" nine times, at 3 nine times, and at 4 nine times again, ending with a half-hitch at 5.

It will easily be seen, as was suggested to me by Professor Mason, that the strain of bending the bow, while tending to stretch and tighten each longitudinal strand, at the same time tightens each individual turn of these lashings, so that the greater the strain on the bow the tighter do they grip the fibers of the wood and hold them together.

These hitches usually occupy 4 to 6 inches of the bow, and as a rule are put on as above, so that the shortest strands come at the top of the

backing, though they are reversed on one bow from the Mackenzie region (Fig. 14 is this section of No. 1970, collected by Ross), so that the longer of the strands are stretched across the bends, which adds somewhat to the tension of the bow, but makes a less neat and compact lashing than the common arrangement. This arrangement of the short strands brings the greatest strength across the middle of the bow, where it is most needed.

All the strands between the hitches are divided into two equal parcels and twisted from the middle into two cables, thus greatly increasing the tension to be overcome in drawing the string. These two cables are fastened together by a sort of "figure-of-8" knot, passing through and around them, and are stopped firmly to the handle, after which the whole is securely seized down with the end of the backing. This seizing is less complete in bows from the region of the Mackenzie. In one case, after completing the seizing the end goes on to lay on a few strands more, for a third cable, outside of and between the other two, which is also twisted. (No. 89245, Figs. 9 and 10. End of cable cut off at *a*.)

The ends of the long strands, between the nocks and the hitches of the short strands, are sometimes wound with separate pieces.

Bows of this pattern, differing only in details of the backing, are used at the Mackenzie River, at Point Barrow, Wainwright's Inlet, Point Hope, and the Diomede Islands in Bering Strait, and probably at intermediate points along the shores of the Arctic Ocean.

As was said above, there are no bows in the collection from Kotzebue Sound or the Kaviak Peninsula, but from several points in the region in question, namely, from Kotzebue Sound, Hotham Inlet, Sledge Island, and Cape Nome, have been obtained many of the ingenious little tools for twisting the cables, and always in pairs, indicating that a two-cable bow of the Arctic type is the prevailing if not the only weapon of the kind used in these localities.

The line of demarcation between this type and the preceding is not sharply drawn, although there are no bows of the pattern which is exclusively used as far north as Cape Romanzoff, in the collection from north of Bering Strait.

From the Yukon delta we have one bow (Fig. 15, No. 33867, collected by E. W. Nelson), which in proportional narrowness and thickness approaches the Arctic model, as it does in its complete seizing, though it has a strong extra rib, and the general pattern of the backing is purely southern. From the same region is another (Figs. 16 and 17, No. 8822, collected by W. H. Dall), which in outline and size is essentially of the straight southern type, though slightly narrower than usual, while the backing is put on entirely in the Arctic manner, except that the seizing is less complete. A large bow from Norton Sound is of the same model, but has the Arctic backing complete in all its details, as does also a small boy's bow from the same region. Still another from the same

place is almost exactly of the Arctic type, except that it has square instead of rounded edges and the strands are not twisted into cables.

When we consider that the Malemut of Norton Sound act as middlemen between the natives of the Arctic coast and those of the Yukon region, it is natural to expect to find traces of Arctic ideas as far south as their intercourse extends, namely, as I am informed, to the mouth of the Yukon. Moreover it would be unlikely that the relatively weak southern backing should be adopted by the northern natives.

III. The Western Type.

This is, in general, broader and flatter than the Arctic model, but less contracted at the handle than the southern, and not so much tapered at the ends, which are usually thick. It is rather a larger bow than the Arctic, but not so large as the southern, being from 43 to 58 inches in length and 1.5 to 1.7 inches broad, and like the others is either straight or of the Tatar shape. Bows of purely western type are apparently always of the latter shape.

The peculiarity of the type is in the backing, as is well shown in the bow figured (Figs. 18 and 19, No. 2505, probably from the mainland of Siberia. It was collected by the North Pacific Exploring Expedition, and is labeled simply "*Tschuktschis Indians*"!). The backing, instead of being continuous, is in three parts, namely, two short cables stretched across the bends, where they do not go round the nocks, but are secured by half-hitches close to them as well as inside the bends. The main backing consists of 21 strands laid on between the bends with half-hitches, and stopped down to the bow with a spiral seizing without being twisted or gathered into a wrapped cable.*

Three large and powerful bows from Saint Lawrence Island are of the same peculiar type. It is, however, worthy of note that a single "twister" of the same pattern as those used at Point Barrow was obtained at Saint Lawrence Island by Mr. Nelson.

The bows used by the Eskimos of Eastern Siberia ("Tuski," "Sedentary Chukches" of authors, Chuklukmut of Dall) present a mixture of types. The bow figured above is purely western in type. Another (Figs. 21 and 22, No. 2508, collected by the North Pacific Exploring Expedition) is straight, but still has separate cables at the ends, passing, however, round the nocks. The main backing has upwards of seventy strands and is twisted into three cables of the Arctic type.

A third (Figs. 23 and 24, No. 2506, collected by the North Pacific Exploring Expedition) approaches very close to the arctic type, but shows traces of the western model in having the ends of the long strands stretched across the bends and one single short strand returning to the

* There is a modification of the "soldier's hitch" in the seizing of this bow (Fig. 20), made by taking two round turns to the right, and passing the end *under* the standing part and *between* the two turns.

tip from beyond the bend,* while a fourth is precisely of the arctic type with a very large number of strands.†

Several of these bows are made of oak, evidently barrel-staves obtained from white men, but are, notwithstanding, provided with a powerful backing, which shows how inseparably this invention, in its origin applicable only to inelastic wood, has become connected with the idea of a bow in the mind of the maker.

Comparing what I have said of the geographical distribution of these types of bow with the divisions of the Eskimos of the Northwest adopted by Mr. Dall,‡ it will be seen that of the Western Mackenzie Innuit (his first great division) the Kopagmut (*Kupû'ñmeun* of the Point Barrow natives) and probably the Kangmaligmut (*Kûñmû'd'lĭñ* of the same people, an almost unknown tribe, concerning whom there appears to be no reliable information), with probably all the Western Innuit except the Chuklukmut, Kikhtŏ'gamut, and Mahlemut, use the pure arctic type. The Chuklukmut and Kikhtŏ'gamut use the western type, with some admixture of the arctic. The Mahlemut and Unaligmut (the northernmost tribe of Fishing Innuit) use the arctic and the southern type and intermediate forms, while the remainder of the Fishing Innuit use the pure southern type.

Assuming, as is highly probable, that all the branches of the Eskimo race started with the primitive form of bow above described, the inhabitants of the well-wooded shores of Bering Sea and the Gulf of Alaska, who have a plentiful supply of fresh living spruce, have improved on this type chiefly by lengthening and strengthening the wood of the bow and collecting the loose strands into a compact round cable, which is occasionally made somewhat thicker across the middle than towards the ends.

Those who live on the treeless shores of the Arctic Ocean are forced to depend on comparatively scarce dead and brittle drift-wood, and have been obliged to devote their attention to the improvement of the sinew backing in order to increase the efficiency of the weapon. The consequence has been the development of the exceedingly complicated and perfect form above described. This is probably the ultimate step in the development of the sinew-backed bow. Not only is it difficult to imagine making a more perfect weapon from the materials, but attention will no longer be paid to possible improvements in a weapon which is rapidly passing into disuse and becoming superseded by fire-arms.

The people of Saint Lawrence Island, out of the direct line of communication between the two continents and also dependent on drift-wood, have developed the bow in a different way from all the rest.

* A peculiar clove-hitch (Fig. 25) occurs at each end of this bow.

† This bow (No. 2507) has a reversed "soldier's hitch" in the seizing (Fig. 26) in which the end passes *under* the standing part and *over* the turns.

‡ Contributions to North American Ethnology, vol. i, p. 23.

They have, as it were, lengthened the ends of the bow beyond the original backing, bent them up, and added extra cables across the bends.

On the mainland of Siberia, where the natives are in direct communication both with Saint Lawrence Island and the arctic shores of the New World, by way of the Diomedes, the bow is of a pattern intermediate between the types of these two regions, partaking more of the characteristics of one or the other, according to the fancy of the maker, perhaps as his dealings have brought him in contact with people of one or the other region.

There is one bow in the Museum, not an Eskimo bow, which is interesting in the present connection. It comes from Sitka, where the Indians use a plain spruce or cedar bow with a round back and flat belly. The bow in question is of the same shape as the other bows from the same locality, but the maker, who has evidently had some acquaintance with the handiwork of the nearest Eskimos, has tried to improve it by putting on a typical "southern" backing of sinew. This, however, is of but little use, as the round back of the bow is not of the proper shape to receive it, and, in spite of the lashing round the handle, it slips off to one side as soon as the bow is bent. I may remark that the bow appears to be new and never to have been used.

NOTE.—It should be borne in mind that what I have said about the geographical distribution of the different forms of bow refers not to the present time, but to the period when this weapon was in general use among the Eskimos of the Northwest. Most of the material in the Museum collection was either collected many years ago or shows signs of having been old and disused when collected.

Fire-arms have so completely superseded the older weapon, especially at the great trading centers like Saint Michael's, that even in distant localities, like Point Barrow, it would be difficult to find half a dozen full-sized bows fit for service. The boys still adhere to the bow for shooting small birds, &c., and for them it is still made as carefully as ever.

NOTE ON THE SINEW-TWISTING TOOLS.—In the above paper, I have had occasion to speak of the toggles or levers used in twisting up the cords of sinew on the back of the bow, making what I have called "cables." These are little flat rods of ivory or hard bone (Fig. 27, No. 89466, front and side view, from Point Barrow, collected by our expedition), about four or five inches long, with the ends slightly bent in opposite directions. These rods serve a double purpose at Point Barrow, for the natives use them for playing a game something of the nature of "pitch-penny." We purchased a number of them under the impression that this was their only use, and it was not until we had been a long time at the station that we were told that two of them made a set and that they were used, somehow, in twisting the sinews on the back of the bow. So few bows are now made that we had no opportunity of seeing them in use.

In looking over the Museum collections on my return, I found large numbers of these tools, all essentially of the same pattern, and generally in pairs, often accompanied by a small ivory marlinespike. They came from many localities along the coast from the Mackenzie region to Norton Sound, and were variously labeled "bow tools," "bow-string twisters," and "arrow polishers" (!) without further explanation, except in the case of one pair collected by Mr. Nelson, which were catalogued as for "tightening the sinew on a bow. Always used in pairs."*

I have been unable to find any published explanation of the method of using these tools. After wasting much time in conjectures, I discovered the *modus operandi* by actual experiment, while making a model of one of the Point Barrow bows. It is very ingenious, and is well shown in the diagram (Figs. 28 and 29, drawn from a working model), The end *a* is thrust between the strands to be twisted, so that the hook catches part of them, and the lever making a half-revolution is brought up against the bow, as in Fig. 28. It can continue the twisting no further in this direction, and if withdrawn for a fresh start the strands would have to be held or fastened in some way, which would make the process a slow one. Accordingly, the rod is thrust through between the strands until the end *b* is where *a* was (Fig. 29), when the hook at *b* catches the strands and the lever is ready for another half-revolution. This is continued, the rod slipping back and forth like the handle of a vise, until the cable is sufficiently twisted.

The reason for using them in pairs was not satisfactorily explained, until Lieut. P. H. Ray, the commanding officer of our expedition, suggested that they could be used simultaneously, one in each cable, so as to secure the same amount of twist in the two. I tested this and found it perfectly easy to work one with each hand.

The accompanying map is a tracing, with some modifications, of part of Mr. Dall's "Alaska and Adjoining Region."

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* Mr. Nelson has kindly favored me with all the information he was able to obtain about these implements. He never saw them in actual use, but the natives of the region about Norton Sound informed him that they were used for "twisting the sinew strands first and then for tightening the plaited or braided sinew backing to the bows after the latter was in place." He describes their use for twisting sinew to make the "hard-laid sinew cord," as follows: "The ends of the sinew cord are tied to the small center holes in the two ivory pieces, one of the latter at each end of the cord, and then they are twisted in opposite directions." He tells me that they are also used for playing a game as at Point Barrow.

PLATE I.

(Murdoch. Eskimo bows.)

FIG. 1. Bow of reindeer antler, with simple backing of sinew, from Cumberland Gulf, No. 34053. Collected by L. Kumlien. Side and back, reduced.

FIG. 2. Straight bow, with simplest form of "Southern" backing, from near Cape Romanzoff, No. 36032. Collected by E. W. Nelson. Side and back, reduced.

NOTE.—Every reduced figure is accompanied by a scale, on which each division represents one inch.

PLATE I.

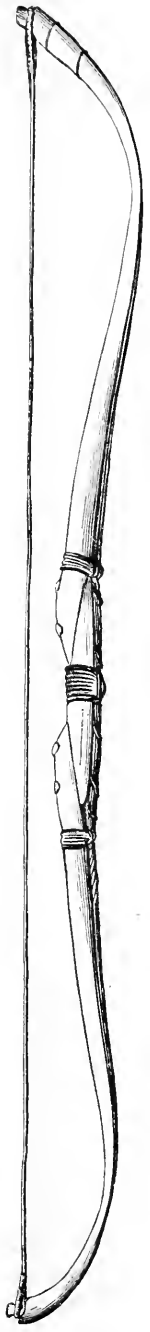


FIG. 1.

FIG. 2.

PLATE II.

(Murdoch. Eskimo bows.)

FIG. 2*a*. One end of No. 36032 (from near Cape Romanzoff. Collected by E. W. Nelson) to show attachment of the backing to the nock. Natural size.

FIG. 3. Straight bow, with "Southern" backing, in which some strands are short, No. 72408, from Bristol Bay. Collected by the late C. L. McKay. Back, reduced.

FIG. 3*a*. The broadest part of the same bow, to show the attachment of the short strands. Natural size.

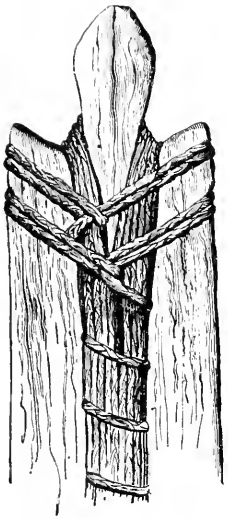


FIG. 2*a*.

FIG. 3.

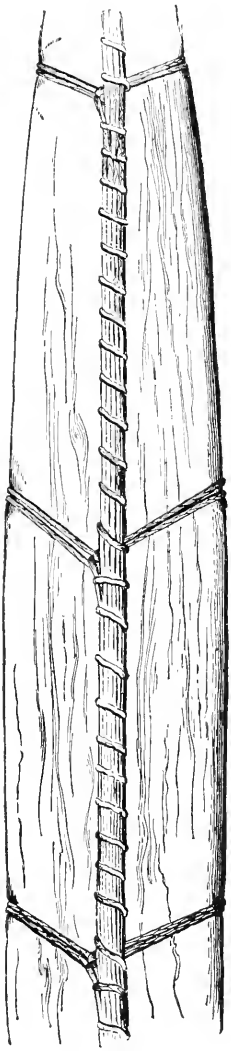


FIG. 3*a*.

PLATE III.

(Murdoch. Eskimo bows.)

FIG. 4. Straight bow, with "Southern" backing, No. 7972, from Bristol Bay. Collected by Dr. Minor. One-half of back, reduced, to show spiral seizing.

FIG. 5. Bow with bent ends, with "Southern" backing, strung, No. 36028, from the mouth of the Kuskoquim river. Collected by E. W. Nelson. Side, reduced.

FIG. 6. Large straight bow, with "Southern" backing, *twisted*, No. 15651, from Nunivak Island. Collected by W. H. Dall. One-half of back, reduced.

FIG. 7. Straight bow, with "Southern" backing, No. 36034. Collected by E. W. Nelson. One-half of back, reduced.

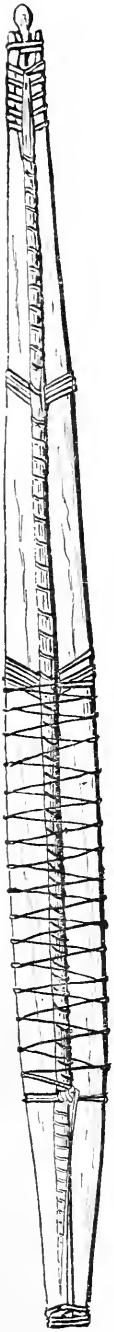


FIG. 4.

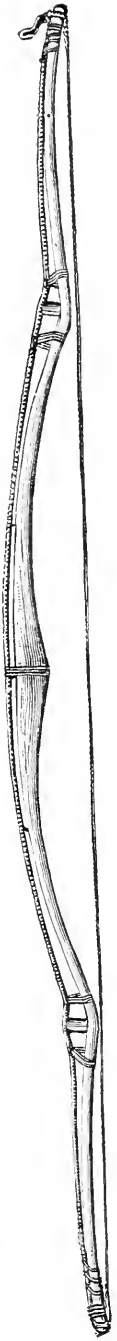


FIG. 5.

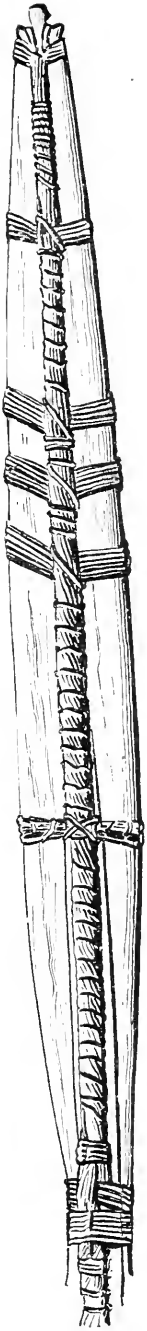


FIG. 6.

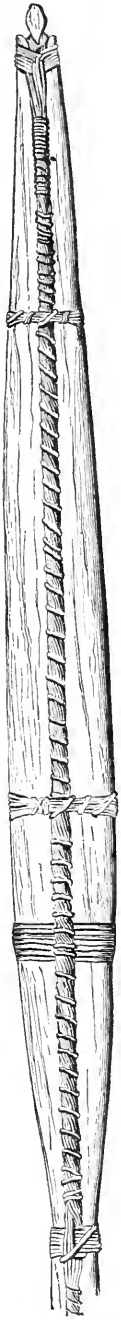


FIG. 7.

PLATE IV.

(Murdoch. Eskimo bows.)

FIG. 8. Straight bow of "Arctic" type, strung, No. 1972, from the Mackenzie region. Collected by Ross. Side and back, reduced.

FIG. 9. Bow of Tatar shape, with "Arctic" backing, No. 89245, from Point Barrow. Collected by United States International Polar Expedition. Side, reduced.

FIG. 12. Left-handed "soldier's hitch."

FIG. 13. Right-handed "soldier's hitch."

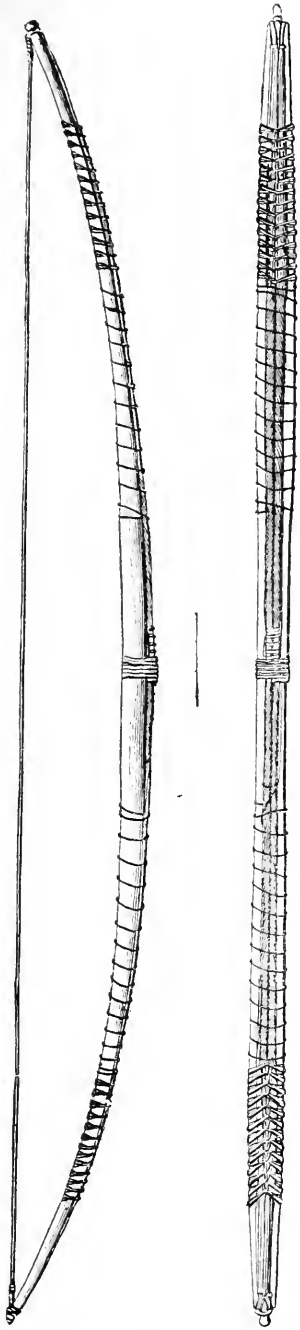


FIG. 8.

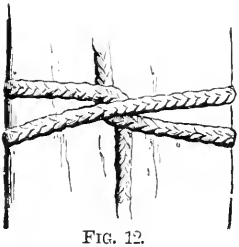


FIG. 12.

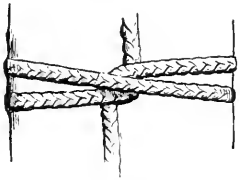


FIG. 13.

FIG. 9.

PLATE V.

(Murdoch. Eskimo bows.)

FIG. 10. Section of "Arctic" bow, No. 89245, to show method of attaching the short strands. Natural size.

FIG. 11. Same section of No. 72771, from Wainwright's Inlet. Collected by United States International Polar Expedition. Natural size.

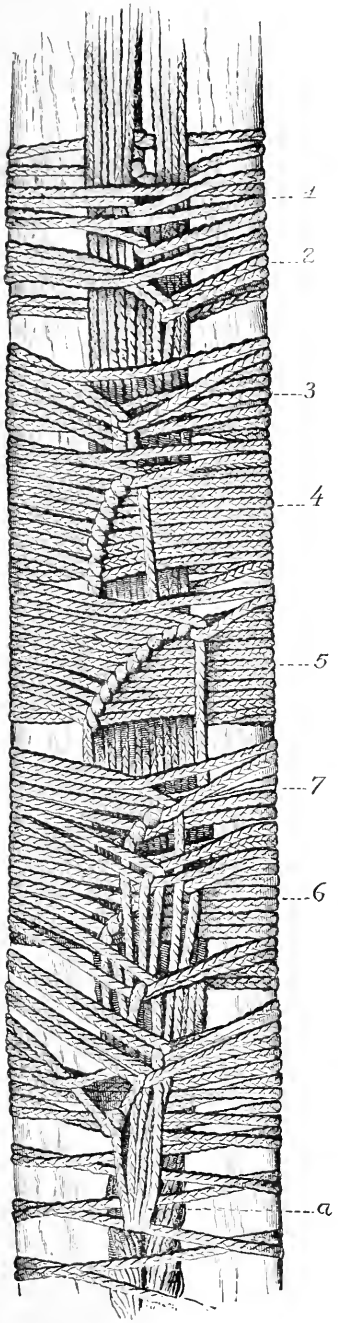


FIG. 10.

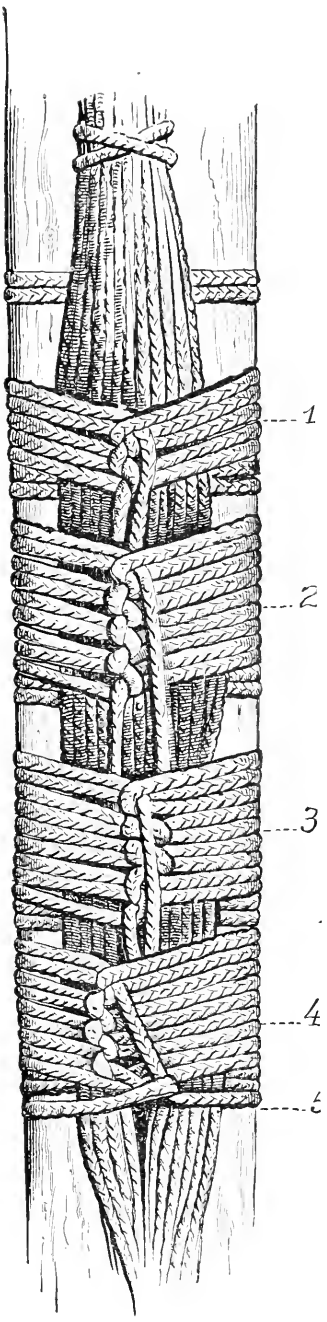


FIG. 11.

PLATE VI.

(Murdoch. Eskimo bows.)

FIG. 14. Section of an "Arctic" bow (No. 1970, from the Mackenzie region. Collected by Ross) to show the peculiar (reversed) attachment of the short strands. Natural size.

FIG. 15. Straight "Southern" bow, No. 33867, from the Yukon delta. Collected by E. W. Nelson, unusually thick and narrow, with complete spiral seizing. Back and side, reduced.

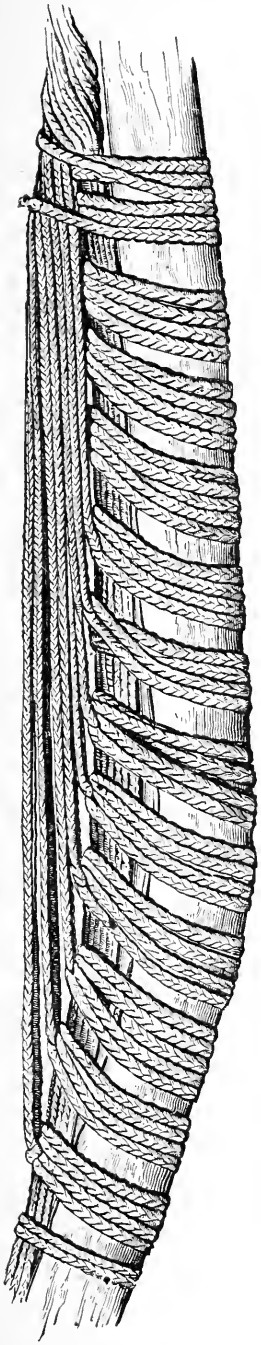


FIG. 14.

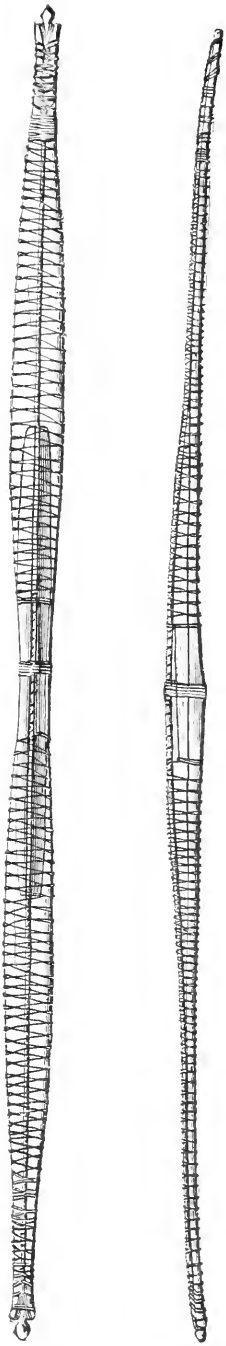


FIG. 15.

PLATE VII.

(Murdoch. Eskimo bows.)

FIG. 16. Straight bow of "Southern" model, with "Arctic" backing, No. 8822, from the Yukon delta. Collected by W. H. Dall. Back, reduced.

FIG. 17. Section of the same bow, natural size, to show the attachment of the short strands.

FIG. 18. Bow of "Western" type, No. 2505, from the mainland of Siberia. Collected by the North Pacific Exploring Expedition. Back and side, reduced.

PLATE VII.

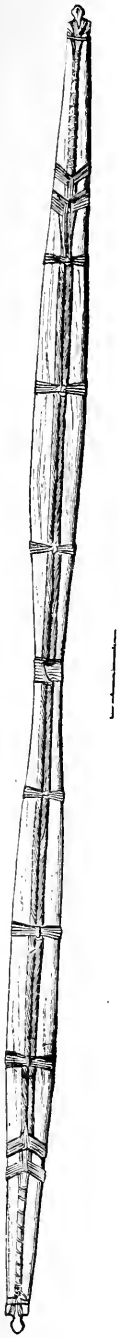


Fig. 16.

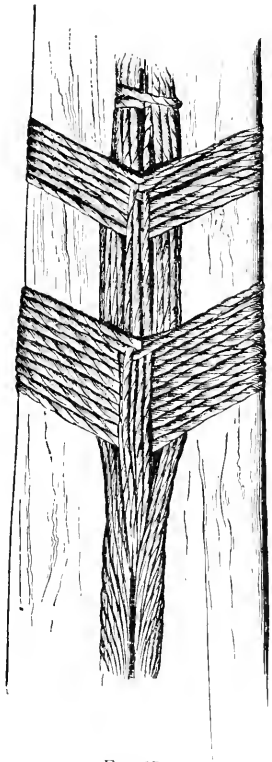


Fig. 17.

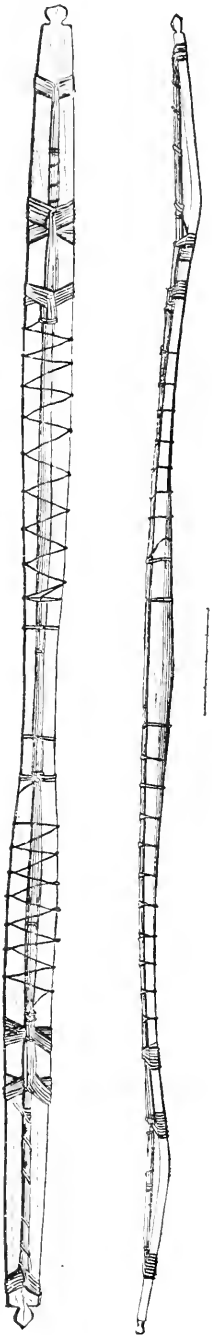


Fig. 18.

PLATE VIII.

(Murdoch. Eskimo bows.)

FIG. 19. Section of No. 2505, to show the attachment of the end cable, underneath the backing. Natural size.

FIG. 20. Modified "soldier's hitch," used on seizing of No. 2505.

FIG. 21. Straight bow, with "Western" backing, No. 2508, from Eastern Siberia. Collected by the North Pacific Exploring Expedition. Back, reduced.

PLATE VIII.

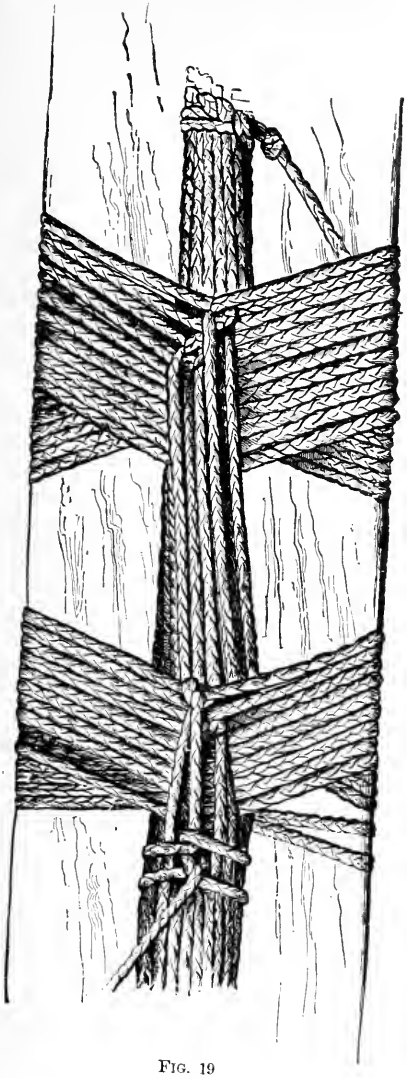


FIG. 19

FIG. 21.

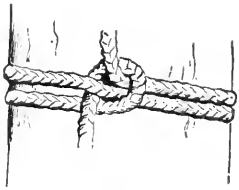


FIG. 20.

PLATE IX.

(Murdoch. Eskimo bows.)

FIG. 22. Section of No. 2505, to show the attachment of the end cable, underneath the backing. Natural size.

FIG. 23. Bow with "Arctic" backing, modified so as to approach the "Western," No. 2596, from Eastern Siberia. Collected by the North Pacific Exploring Expedition. Back and side, reduced.

PLATE IX.

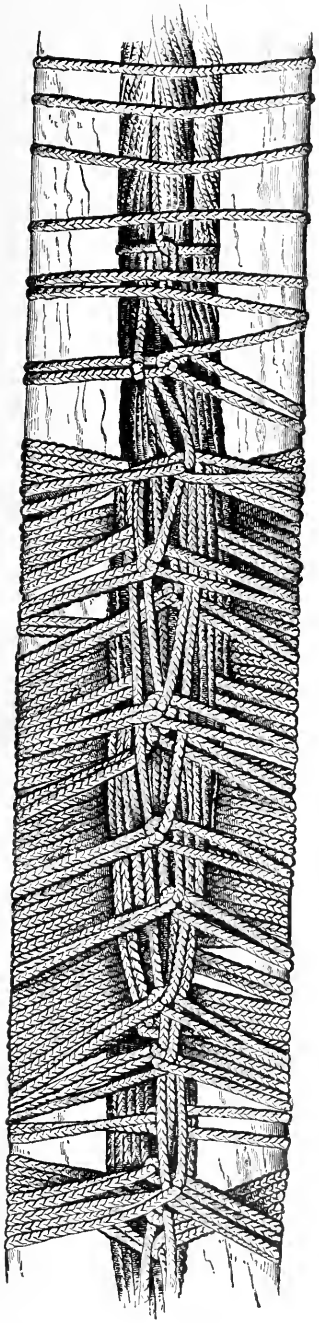


FIG. 22.

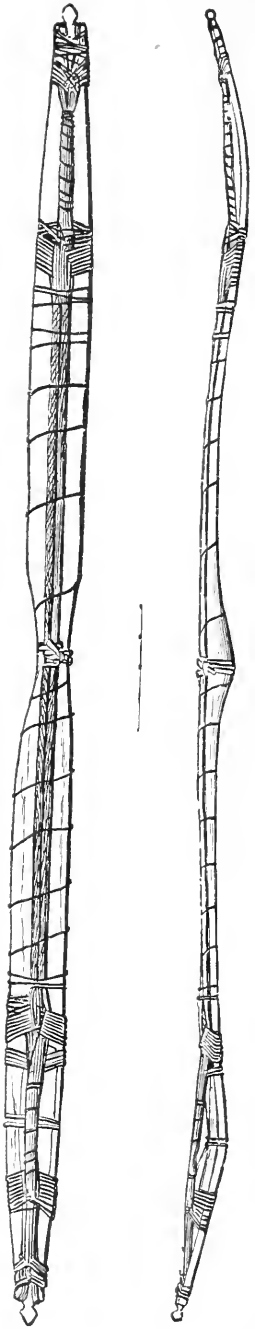


FIG. 23.

PLATE X.

(Murdoch. Eskimo bows.)

FIG. 24. Section of No. 2506, to show the attachment of the single short strand, returning from bend to nock. Natural size.

FIG. 25. Peculiar clove-hitch used on the same bow.

FIG. 26. Reversed "soldier's hitch" in the seizing of No. 2507, from Eastern Siberia. Collected by the North Pacific Exploring Expedition.

FIG. 27. Sinew-twisting tool of ivory, No. 89466, from Point Barrow. Collected by United States International Polar Expedition. Front and side, natural size.

PLATE X.

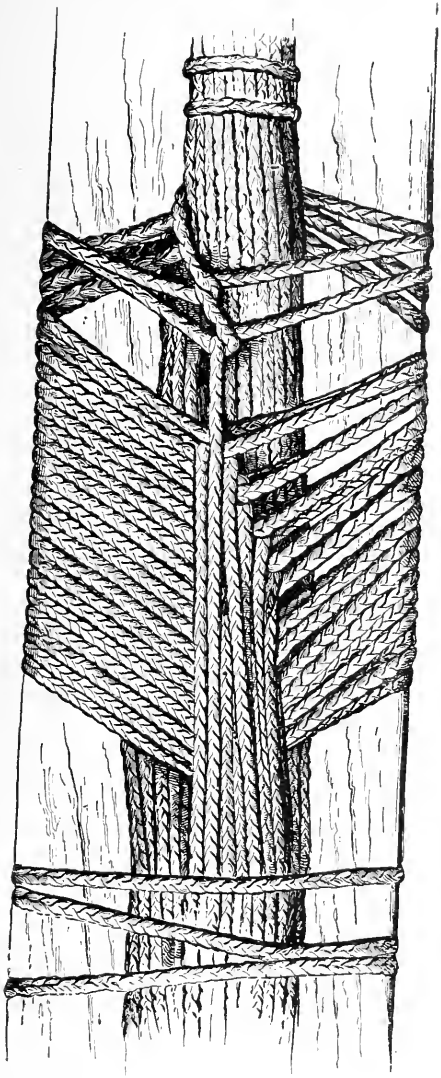


FIG. 24

IG. 27.

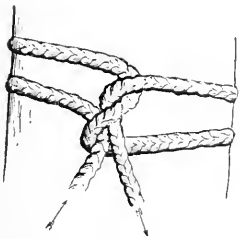


FIG. 25.

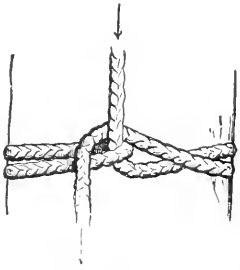


FIG. 26.

PLATE XI.

(Murdoch. Eskimo bows.)

The process of twisting the two "cables" of the "Arctic" backing. From a working model, reduced one-half.

FIG. 28. Position of the tools at the end of a half-turn.
FIG. 29. Position of the same, with the tools slipped through to begin a new half-turn.

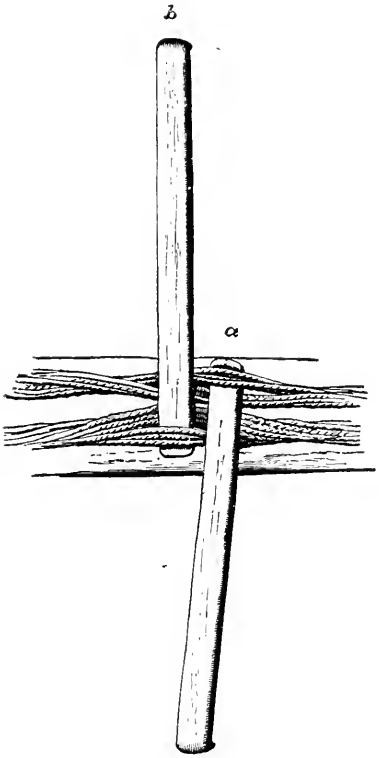


FIG. 28.

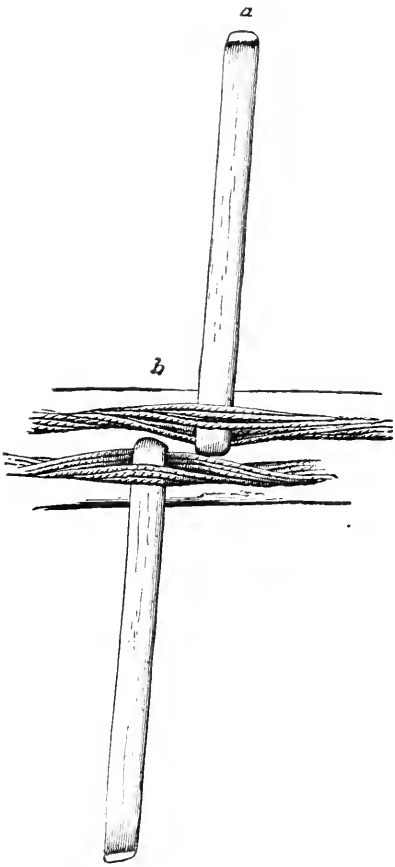
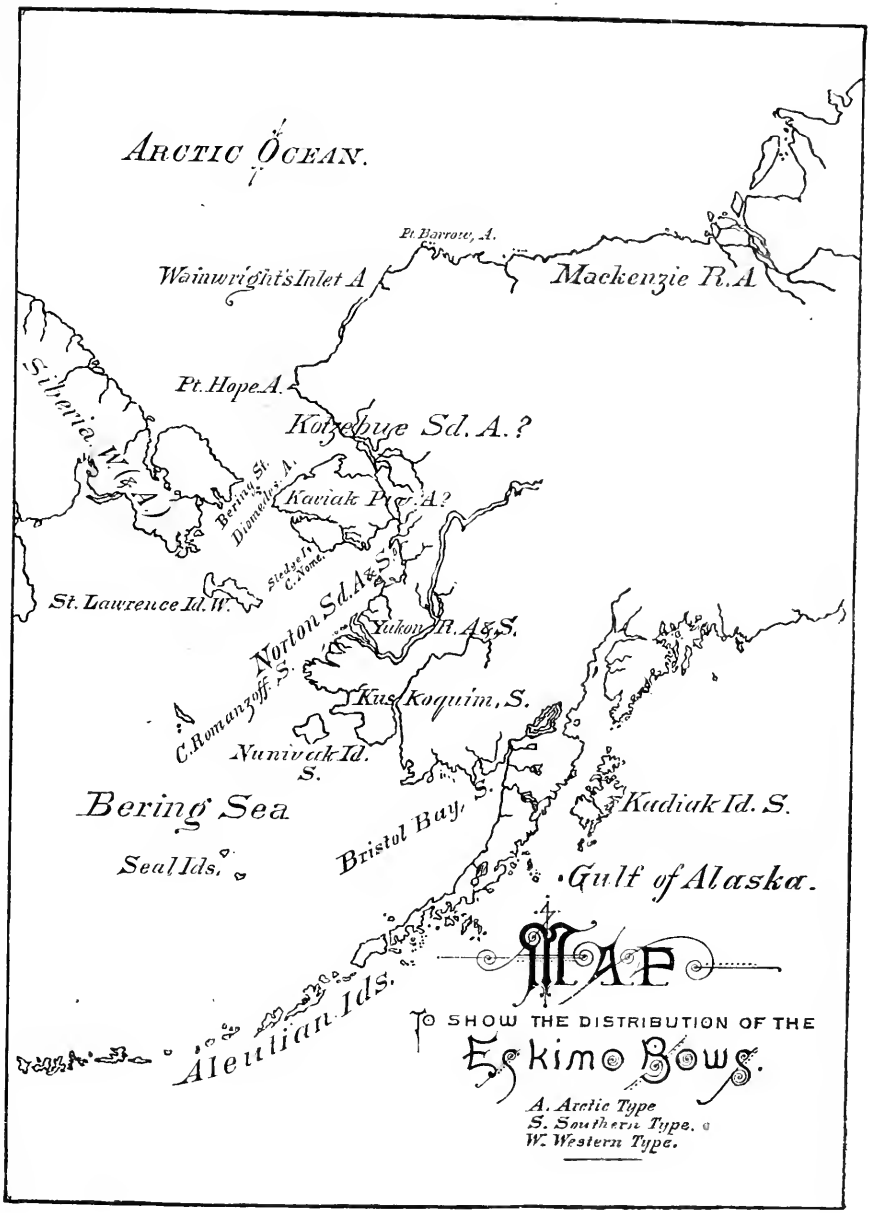


FIG. 39.

PLATE XII.

(Murdoch. Eskimo bows.)

A map to illustrate the distribution of Eskimo bows in Alaska and the neighboring regions. (A tracing, with some modifications, from Mr. Dall's "Alaska and the Adjoining Region.")


ARCTIC OCEAN.
Pt Barrow, A.
Wainwright's Inlet A
Mackenzie R. A
Siberia
Pt. Hope A.
Kotzebue Sd. A.?
Bering St.
Diomedes A.
Kaviak Pt. A?
Sledge Is.
C. Nome.
St. Lawrence Id. W.
Norton Sd. A & S.
Yukon R. A & S.
C. Romanzoff S.
Kuskoquim, S.
Nunivak Id. S.
Bering Sea
Kudiak Id. S.
Seal Ids.
Bristol Bay
Gulf of Alaska.
Aleutian Ids.
A MAP
TO SHOW THE DISTRIBUTION OF THE
Eskimo Bows.
A. Arctic Type
S. Southern Type.
W. Western Type.

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